

Local Bridge Improvement Assistance Pilot Program

Southeast Wisconsin Transportation Symposium

October 6, 2023

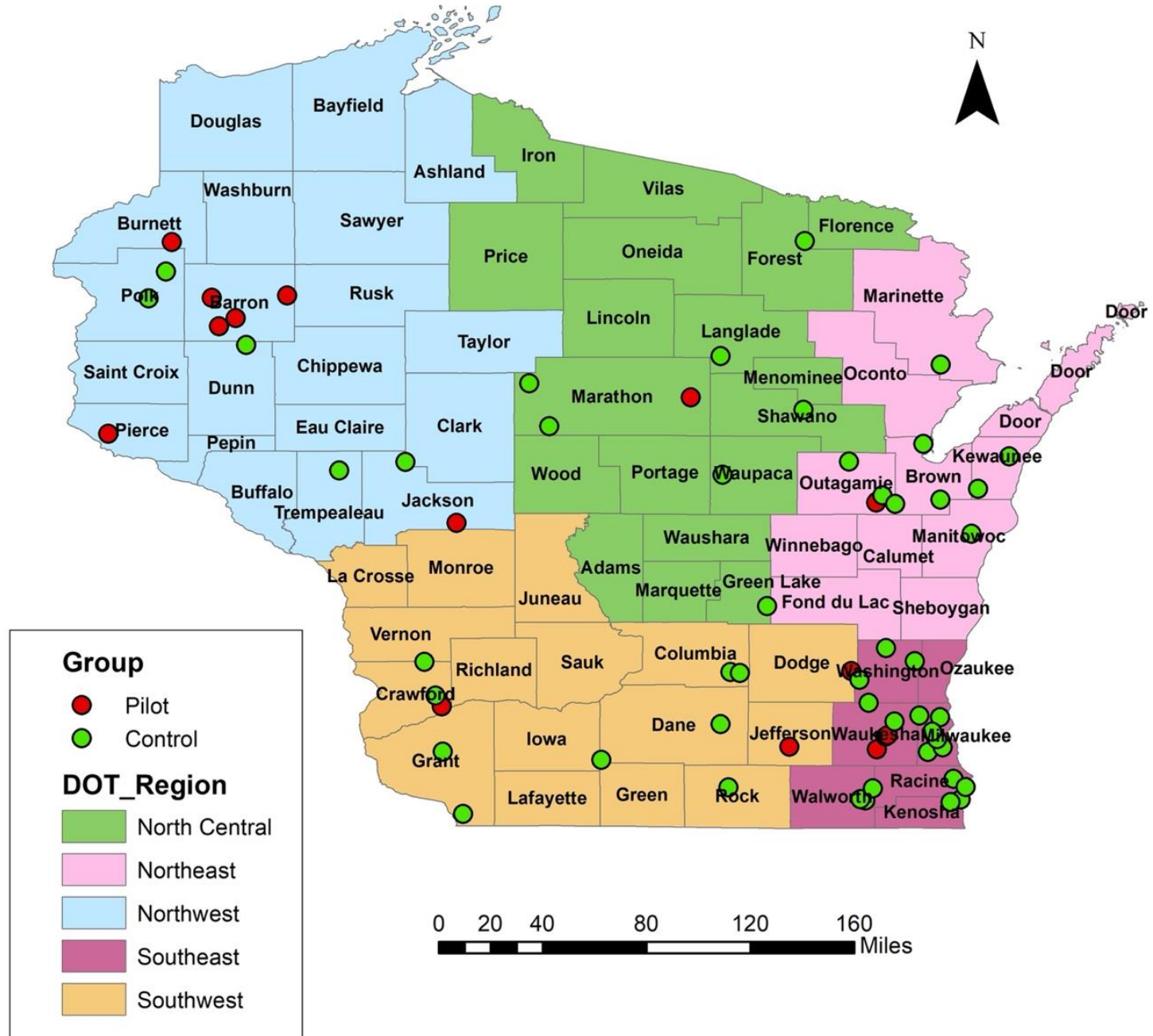
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Study Overview

- **Problem:** In 2019, a pilot program to streamline the delivery and oversight of low-risk local bridge projects was initiated by WisDOT in consultation with WCHA. An assessment of this pilot program was needed to determine its effectiveness before it is implemented on a wider scale.
- **Objective:** Evaluate the Local Bridge Improvement Assistance Pilot Program and make recommendations for possible modifications and expansion to other areas of the local assistance program.

Map of Pilot and Control Projects



Overview of Study Tasks

Task	Description
Task 1	Obtain available data on pilot (16) and control (50) bridges
Task 2	Review the performance metrics developed by WisDOT
Task 3	Conduct a survey of local sponsors and stakeholders
Task 4	Analyze data, identify problems, and make recommendations
Task 5	Reports

Task 1 & 2: Data Collection & Preparation

- UWM team collected all available information that may be relevant to project performance from the Highway Structures Information System (HSI), project proposals, and design plans.
- Wisconsin DOT helped collect performance measure data related to budget, schedule, and quality.
- A database of project information from 16 pilot bridges and 50 control bridges is developed.

Task 3 Survey

- Online (Qualtrics) survey and follow-up phone calls
- Responses from 20 individuals received (out of 38 requests)
- Talked to 7 individuals (out of 20) who agreed to phone interview

Impact on cost, project schedule, and quality

- Most respondents believed that the pilot program had the potential to reduce project costs.
- A slight majority of respondents believed that the pilot program had the potential to maintain or shorten project time.
- There was no consensus on the impact of the program on project quality.

Workload redistribution

- A few DOT personnel had expected that the pilot program would reduce their project workload, which they believe was not realized.
- The main goals of the pilot program were focused on project cost, time, and project quality. The redistribution of the workload to the local governments may be viewed as an expected benefit of the pilot program but it is not a primary goal of the program.

Perception gaps

- WisDOT and local government personnel viewed the pilot program with differing expectations.
- Communication issues and project understanding issues were noted.
- There is a clear need to provide training to address and clarify the goals of the program and ways to successfully achieve them. Each stakeholder's tasks and responsibilities should be clearly understood by all parties.

Clarity and consistent expectations

- *Some* DOT personnel may not be fully aware of the reduced project requirements for low-risk projects.
- Some local government personnel may not be fully aware of all the requirements and steps required to successfully implement the low-risk project.
- Different training programs are needed for both WisDOT and local government personnel. This training should clarify the goals and requirements of the low-risk pilot program and delineate the responsibilities and expectations for all sides.

Technical capabilities and knowledge of the project requirements

Disparity in technical capabilities and knowledge of the project requirements among local governments creates issues in program delivery.

- Some local governments have experienced personnel available while others may not have the in-house staff to address all technical and management aspects.
- The program should work to ensure that the local governments wishing to participate in the program are well prepared.

Summary of Survey Observations

The survey results indicate that the low-risk pilot program is deemed beneficial and useful by most respondents.

1. Impact on cost, project schedule, and quality
2. Workload redistribution
3. Perception gaps
4. Clarity and consistent expectations
5. Technical capabilities and knowledge of the project requirements

Task 4: Data Analyses and Recommendations

- Providing summary statistics on contributing data items and performance metrics for the pilot group and control group, respectively
- Comparing pilot group and control group using statistical tests (t-test for continuous data and Chi-square test for binary data)
- Evaluating the pilot program using the performance criteria developed by WisDOT

Summary of Data Analyses

Our data analyses support the following observations on the pilot program:

- 1) better performance in budget
- 2) better performance in schedule except for Schedule #3: construction finals
- 3) mixed performance in quality, depending on the evaluation method used

Overall Summary

- The comprehensive performance of WisDOT's low-risk bridge pilot program was evaluated using both the qualitative method (survey) and the quantitative method (data analysis).
- Both the survey and data analysis results produced remarkably similar outcomes: *the low-risk pilot program improves the project performance mainly in budget and schedule.*

Recommendations

- Enhance effectiveness of the program with communications and training
 - The goals of the program and ways to successfully implement them should be clarified and understood by all.
 - Each stakeholder’s tasks and responsibilities should be clearly communicated and understood by all.
 - The reduced oversight requirements of low-risk projects should be understood by all (through training).
- Reduce disparity in experience and knowledge related to project requirements
 - Training should be made available to local government staff who will handle the low-risk projects.
 - Demonstrate the required knowledge and capability in the management of such projects.
 - One possible option when capabilities are not established in advance: Submit the project to the low-risk program after completing the preliminary (30%) plans.
- Improve WisDOT’s performance measures.
 - Consider revising some of the threshold levels to better conform with statistical analysis results.
 - Enhance internal processes to improve outcomes of lower performing measures (schedule #3 and all quality measures).

Report

Evaluation of the Local Bridge Improvement Assistance Program

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WisDOT ID no. 0092-21-63

December 2022

- Report: <https://wisconsindot.gov/documents2/research/0092-21-63-final-report.pdf>

Performance of the Pilot Program

			Budget		Schedule			Quality		
			#1	#2	#1	#2	#3	#1	#2	#3
Analysis #	Data	Evaluation Method	Project Cost	Project Delivery	Design Schedule	Delivery Schedule	Construction Finals	Environmental Document Reviews	Construction Contract Modification	Construction Contract Modification - Communication
1	Full Data (16 vs. 50)	Data-driven Statistical Approach								
		Criteria by WisDOT								
2	Long Bridges Excluded (16 vs. 40)	Data-driven Statistical Approach								
		Criteria by WisDOT								
3	Long Bridges Excluded Super Accelerated Bridges Excluded (12 vs. 40)	Data-driven Statistical Approach								
		Criteria by WisDOT								
4	Long Bridges Excluded No Management Consultant (16 vs. 24)	Data-driven Statistical Approach								
		Criteria by WisDOT								

Legend

	Data-driven Statistical Approach	Criteria by WisDOT
	Improved, statistically significant	Success
	Improved, not statistically significant	Probable Success 18
	No improvement	Failure

Analysis #2: Excluding Long Bridges in the Control Group

Statistical Analysis on Performance Metrics

Most performance measures are **improved** in the pilot group.

Analysis was also conducted on the two improvement types: rehabilitation and relace. Performance measures are also improved in those cases.

*The comparison was conducted using a t-test or a Chi-squared test. When the p-value is less than 0.05, the difference is considered statistically significant.

Green or red color indicates better or worse performance for the pilot group, respectively.

Mean Value (Min, Max)	Pilot Group (16 cases)	Control Group (40 cases)	Different*? (statistically significant)
Cost Per Sq Ft	\$208.18 (\$36.82, \$315.19)	\$282.77 (\$117.86, \$447.90)	Yes
Total Design Delivery Cost	\$51,532.55 (\$39,787.1, \$68,062.09)	\$77,184.76 (\$34,792.45, \$206,727.44)	Yes
Total Design Delivery Cost Per SqFt	\$35.18 (\$9.30, \$54.97)	\$47.02 (\$8.46, \$90.51)	No
Total Construction Delivery Cost	\$41,818.43 (\$20,422.28, \$67,229.55)	\$78,592.70 (\$29,130.89, \$229,556.40)	Yes
Total Construction Delivery Cost Per SqFt	\$26.60 (\$8.00, \$53.00)	\$43.00 (\$22.00, \$73.00)	Yes
Number of Days From Scheduled PSE at Initiation to Actual PSE Delivery	19.00 (0, 274)	156.33 (-274, 1,492)	Yes
"Design Delivery Time"	476 (200, 866)	773.55 (148, 1,624)	Yes
Number of Days From Substantially Complete to Records and Quantities Submitted	138.07 (11, 286)	104.52 (25, 252)	No
Number of Environmental Document Reviews by WisDOT	11 out of 16 equals one	11 out of 39 equals one	No
Percentage of Construction Contract Modification	0.03 (-0.03, 0.24)	0.01 (0, 0.10)	No
Communication of Construction Contract Modification	3 out of 10 is successful	6 out of 13 is successful	No

Criteria developed by WisDOT*

Exclude seven long bridges (> 123 ft) in the control group

		Budget					
		#1 Project Cost		#2 Project Delivery			
Improvement Type	Design ID	Cost Per Sq Ft	Average Value of the Control Group for the Same Improvement Type	Total Delivery Cost	Average Value of the Control Group for the Same Improvement Type	Total Delivery Cost Per SqFt	Average Value of the Control Group for the Same Improvement Type
Rehabilitation	2718-19-00	37	224 (3 cases)	40855	360668 (1 case)	9	44 (1 case)
	2718-20-00	49		71518		18	
	8844-00-01	111		98879		25	
	7894-03-03	137		87345		22	
	2790-03-00	145		110906		33	
Replacement	7027-00-00	206	280 (33 cases)	107046	142515 (25 cases)	74	87 (25 cases)
	8827-00-00	209		83900		51	
	6500-03-00	212		106267		96	
	3636-00-02	256		89973		86	
	9443-01-00	257		123649		67	
	5329-00-00	265		76581		67	
	4665-01-00	271		127753		88	
	8317-00-00	281		76920		76	
	8333-00-00	289		69546		81	
	8328-00-00	290		71257		66	
	3818-00-00	315		109404		104	
Measurement		Success 75% (12/16) =75%		Success 100% (16/16) > 50%		Success 81.25% (13/16) >50%	

Criteria developed by WisDOT*

Exclude seven long bridges (> 123 ft) in the control group

		Schedule				
		#1 Design Schedule	#2 Delivery Schedule		#3 Construction Finals	
Improvement Type	Design ID	Number of Days From Scheduled PSE at Initiation to Actual PSE Delivery	"Design Delivery Time"	Average Value of the Control Group for the Same Improvement Type	Number of Days From Substantially Complete to Records and Quantities Submitted	=<180 days
Rehabilitation	2718-19-00	0	866	988 (3 cases)		
	2718-20-00	0	629		11	Yes
	8844-00-01	274	484		78	Yes
	7894-03-03	0	497		79	Yes
	2790-03-00	0	741		127	Yes
Replacement	7027-00-00	0	523	743 (33 cases)	56	Yes
	8827-00-00	30	263		183	No
	6500-03-00	0	355		92	Yes
	3636-00-02	0	536		49	Yes
	9443-01-00	0	208		63	Yes
	5329-00-00	0	796		118	Yes
	4665-01-00	0	355		92	Yes
	8317-00-00	0	200		286	No
	8333-00-00	0	200		286	No
	8328-00-00	0	200		286	No
	3818-00-00	0	763		265	No
Measurement		Success a. 87.5% (14/16) > 75% b. Average value for the pilot =19 < 208.54 (Average value for the 36 control)	Success 87.5% (14/16) >75%		Failure 66.67% (10/15) <100%	

Criteria developed by WisDOT*

Exclude seven long bridges (> 123 ft) in the control group

		Quality				
		#1 Environmental Document Reviews		#2 Construction Contract Modification		#3 Construction Contract Modifications – Communication
Improvement Type	Design ID	# Environ Document Reviews by WisDOT	=1	Percentage	Average Value of the Control Group for the Same Improvement Type	If the number of modification justifications received by the LPA matches the total number modifications on the project
Rehabilitation	2718-19-00	1	Yes		6.25% (1 case)	
	2718-20-00	1	Yes	-2.54%		No
	8844-00-01	1	Yes	1.91%		No
	7894-03-03	2	No	0.00%		Yes
	2790-03-00	2	No	24.11%		No
Replacement	7027-00-00	2	No	0.00%	1.07% (25 cases)	Yes
	8827-00-00	1	Yes	0.15%		
	6500-03-00	1	Yes	0.60%		No
	3636-00-02	2	No	12.83%		No
	9443-01-00	1	Yes	0.63%		No
	5329-00-00	1	Yes	0.00%		Yes
	4665-01-00	2	No	0.14%		No
	8317-00-00	1	Yes	0.59%		
	8333-00-00	1	Yes	1.72%		
	8328-00-00	1	Yes	0.10%		
	3818-00-00	1	Yes	2.06%		
Measurement		Probable Success 68.75% (11/16) < 75%		Success a. 73.33% (11/15) >50% b. Average value for the pilot =2.16% <5%		Failure 30% (3/10) <100%